Project Title: 40 years of fuel, fire & plant data from a long-term Rx fire study in southern pine located on the Osceola National Forest, Florida

JFSP project ID number: 13-JV-11330136-078

PI name & affiliation: Dale Wade, private contractor through USFS, Southern Research Station

Abstract: This data archival project is described in the JFS proposal and consists of a dataset containing 12folders, 2 subfolders, 37 text files, 68 Excel workbooks with over 400 worksheets, and about 1000 slides that document a longterm prescribed fire study on the Osceola National Forest, 50 miles West of Jacksonville, FL. Material in this dataset includes USFS study documentation, information pertaining to fires conducted, and vegetation and fuel responses from its establishment in 1958 through 2005. This dataset is archived at the USFS data archive site which can be accessed at >http://www.fs.usda.gov/rds/archive/<.

History of the Osceola long term Rx fire plots

The Osceola study location is located on the USFS Southern Research Station, Olustee Experimental Forest within a few miles of Olustee, FL, about 15 miles West of Lake City. This ~50-acre study was established by the USFS Southeastern Forest & Range Experiment Station Southern Forest Fire Laboratory in 1957 to evaluate different fire return intervals on hazardous fuel accumulation. Previous fire history is unknown, but the general area was burned every 4 to 6 years with dormant season backfires since World War II. The original longleaf pine stand was clearcut around WWI and seeded in with longleaf and a few slash pine. At establishment in 1957, the overstory averaged 45 yr in age, 11.2" dbh and 65 ft in height. The original stand had been turpentined and a few unmerchantable trees were left which skewed the age, diameter and height averages. These old, flat-topped veterans were still alive in 2003,although some were, perhaps wrongly, listed as 'suppressed' in inventories conducted at study establishment. Another caveat regarding stand age is that longleaf seedlings spend several years in a grass stage before initiating height growth which also influences calculations. Elevation differences are less than 2 feet. There is no evidence of turpentining or thinning in this second growth stand.

The study is comprised of six replications of 4 treatments with each treatment plot 4x5 chains (2-acres) in size. Treatments were winter burns every 2, 4 or 6 years and a no-burn control. All plots (including controls) were burned with backfires the winter of 1958-59. Pre burn sampling showed the forest floor averaged 11,750 pounds per acre and live understory less than 1" dbh averaged 3,188 pounds per acre. The 6-yr burn treatment was converted to an annual dormant season burn after the 1963 burns because it was visually obvious after burning the 4-yr plots with strip-headfires for the first time, that 6 years was too long a fire-free interval to keep the hazard within acceptable limits.

Sampling protocols changed over the years, so besides providing a record of long-term vegetation changes, the dataset allows comparison of various sampling schemes and methodologies, some of which were used concurrently (e.g. fuel moisture). Litter was originally sampled prior to each burn using a 1-foot square steel frame as a guide to cut down to mineral soil with a serrated trowel. Forty samples were cut on predetermined transects equally spaced over each plot. Vegetation was sampled using a double sampling technique: Live understory

weights were estimated ocularly on 30 quarter-milacres. Of the 30, six (the lightest and heaviest + 4 randomly selected) were clipped for actual weight determination. A linear regression analysis was then performed and the resulting prediction equations used to adjust the remaining 24 estimated vegetative weights. Each treatment was handled separately We began using a mathematical procedure in the early 1970's to randomly locate sampling points that had not been sampled within the past decade (data showed a quasi-steady state forest floor equilibrium between accumulation and decomposition was reached in roughly 10-12 yrs). A 12 inch diameter circular steel toothed impact sampler was developed (Sackett 1971) to sample the forest floor, but proved too heavy for most personnel to efficiently use.

Ten dominant/codominant overstory trees near the center of each plot were selected as permanent measurement trees in 1957, blazed, banded with paint and numbered, but the numbers became unreadable before we realized the extent of the problem. These trees were last measured the winter of 1969-70, but cruises have been periodically conducted, the last in December 2003.

Other pertinent facts include:

1) In 1958, a sister study was established on the Francis Marion NF near Charleston, SC (see13-JV-11330136-075).
2) Initial soils work on the study area was conducted by Louis Metz, but the results had not yet been digitized when the Southern Forest Fire Lab was closed in 1985 and the hard copy trashed along with many other files and photos pertaining to this study. Duplicates should have been retained both at Station headquarters and by the soils RWU that did the sampling, but that was not apparently the case. Bill McKee resampled the soils and found many benefits of frequent winter burning and potential long-term harm when unburned; he published his results in 1982 (See publications folder)
3) Unlike virtually all other USFS research studies, Southeastern (now Southern) Research Station staff did all sampling and conducted every burn (until I retired in 2003) with occasional help from Olustee personnel, and the use of National Forest or Florida Forest Service equipment to blade control lines prior to burning and to provide standby when requested.
4) The Macon Fire Laboratory Project Leader (PL) in charge of the study decided its objective to determine an acceptable fire-free interval for hazard reduction had been met and ordered the study closed after 12 years. Plots were burned and intensively sampled the winter of 1969-70, a final report written (see Sackett 1971 in the publications folder) and the study officially closed. Unit scientists thought the decision to close this study ill-advised as obvious visual vegetation changes were continuing to take place. Fortuitously, the Project Leader accepted an FAO assignment in 1971 allowing us to 'bootleg' study treatments in his absence. Upon his return in 1973 he was immediately transferred to Tempe AZ. One unit scientists went with him, one left to attend grad school in the Pacific Northwest and I transferred to South Florida, close enough to continue to apply burn treatments as scheduled with approval of my new PL.
5) All burn plots including the 4's were occasionally burned with headfires, sometimes to accommodate piggyback studies. Depending upon weather conditions, headfires can produce fairly high fireline intensities and severe crown scorch resulting in substantial growth loss and occasional mortality

6) Unrestricted, open cattle grazing was eliminated in the mid 1970's and the last allotment closed in the 80's

7) While located in South Florida I wrote a new study plan and assumed my PL (located in Macon, Georgia) had signed and sent it on as he continued to approve my field work on the study, but it was apparently never forwarded to station headquarters for required signatures. When I transferred back to Macon in 1979 and this oversight was discovered, I wrote another brief study plan with the primary objective to evaluate the long-term site responses to these 4 treatments. A copy is in the study folder.

8) While short-handedly burning the isolation strip around the study site in 1985, the fire spotted into check plot D. I made the decision to let the plot burn rather than putting a plowline through the plot. The Keetch Byram Drought Index was fairly low so although the fire top-killed most understory plants, it did not consume much of the duff.

9) Study plots were sampled prior to and after all treatment applications and fire behavior and burning conditions recorded, although some data was trashed by overzealous research support personnel before I could save it when the fire laboratory was ordered closed by Fire Research Director CW Philpot in 1985. Renowned Tall Timbers fire ecologists Jeff Glitzenstein and Donna Streng conducted a detailed plant survey in the 1990's (see the publications folder for numerous talks and related publications).

10) Several Red Cockaded woodpecker (RCW) (a federally listed T&E species which excavates nests in live southern pine) colonies (which require frequent fire) occur on the study area. Notes pertaining to these birds should be on file both in the Osceola NF supervisors office and at the USFWS Recovery Team headquarters.

11) Variation in fuel weight and fuel consumption over time for a particular treatment on a given site is quantified for over 40 years. The range in burning conditions and associated fire behavior, and their effects on floral responses can be used to fine-tune Rx fire prescriptions for specific objectives. Information embedded in this dataset can shed light on a wide range of knowledge gaps including fire effects on coarse woody debris (CWD) decay rates, lightning strike incidence and resulting tree mortality, and carbon sequestration. Information herein can be used to check the validity of and improve a host of models currently used to predict fire behavior, consumption and emissions. The accuracy of currently used values/thresholds for burn authorization decisions can be ascertained and modified as needed. The dataset also provides a huge cornerstone to the accumulating body of data that shows the gross overprediction of Environmental Protection Agency consumption input values for emission guidelines that this federal agency has consciously and consistently ignored for over 30 years.

12) A suite of comparable summer burn treatments was established adjacent to the dormant season study area in 2002

13) With my retirement January 1, 2003, the study area began a down-hill slide. RWU forester D. Combs did his best to sample and see that scheduled burn treatments were carried out, but he received no encouragement from his new supervisor or the RWU leader. To my knowledge, study treatments were last applied the winter of 2004-05, but because the RCW is protected by federal statute, its habitat must be maintained which leads me to believe that study treatment plots have likely been periodically burned since then.

14) A forester attached to USFS Southern Research Station Center for Forest Disturbance Science Research Work Unit 4156 in Athens, GA is now USFS prescribed burn certified and plans are to reinstate the burn schedule the winter of 2015-16. Contact Team Leader Mac Callaham at http://www.srs.fs.usda.gov/forestdisturbance/ for current information on this study.

Dale Wade 3/26/2015